

Fishery Data Series No. 05-74

Southeast Alaska Steelhead Snorkel Surveys of Regional Index Streams, 2002 and 2003

by

Roger D. Harding

December 2005

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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Weights and measures (metric)		General		Measures (fisheries)	
centimeter	cm	Alaska Department of		fork length	FL
deciliter	dL	Fish and Game	ADF&G	mideye-to-fork	MEF
gram	g	Alaska Administrative		mideye-to-tail-fork	METF
hectare	ha	Code	AAC	standard length	SL
kilogram	kg	all commonly accepted		total length	TL
kilometer	km	abbreviations	e.g., Mr., Mrs., AM, PM, etc.		
liter	L			Mathematics, statistics	
meter	m	all commonly accepted		<i>all standard mathematical</i>	
milliliter	mL	professional titles	e.g., Dr., Ph.D., R.N., etc.	<i>signs, symbols and</i>	
millimeter	mm			<i>abbreviations</i>	
		at	@	alternate hypothesis	H _A
		compass directions:		base of natural logarithm	<i>e</i>
		east	E	catch per unit effort	CPUE
		north	N	coefficient of variation	CV
		south	S	common test statistics	(F, t, χ^2 , etc.)
		west	W	confidence interval	CI
		copyright	©	correlation coefficient	
		corporate suffixes:		(multiple)	R
		Company	Co.	correlation coefficient	
		Corporation	Corp.	(simple)	r
		Incorporated	Inc.	covariance	cov
		Limited	Ltd.	degree (angular)	°
		District of Columbia	D.C.	degrees of freedom	df
		et alii (and others)	et al.	expected value	<i>E</i>
		et cetera (and so forth)	etc.	greater than	>
		exempli gratia		greater than or equal to	≥
		(for example)	e.g.	harvest per unit effort	HPUE
		Federal Information		less than	<
		Code	FIC	less than or equal to	≤
		id est (that is)	i.e.	logarithm (natural)	ln
		latitude or longitude	lat. or long.	logarithm (base 10)	log
		monetary symbols		logarithm (specify base)	log ₂ , etc.
		(U.S.)	\$, ¢	minute (angular)	'
		months (tables and		not significant	NS
		figures): first three		null hypothesis	H ₀
		letters	Jan,...,Dec	percent	%
		registered trademark	®	probability	P
		trademark	™	probability of a type I error	
		United States		(rejection of the null	
		(adjective)	U.S.	hypothesis when true)	α
		United States of		probability of a type II error	
		America (noun)	USA	(acceptance of the null	
		U.S.C.	United States	hypothesis when false)	β
			Code	second (angular)	"
		U.S. state	use two-letter	standard deviation	SD
			abbreviations	standard error	SE
			(e.g., AK, WA)	variance	
				population	Var
				sample	var
Weights and measures (English)					
cubic feet per second	ft ³ /s				
foot	ft				
gallon	gal				
inch	in				
mile	mi				
nautical mile	nmi				
ounce	oz				
pound	lb				
quart	qt				
yard	yd				
Time and temperature					
day	d				
degrees Celsius	°C				
degrees Fahrenheit	°F				
degrees kelvin	K				
hour	h				
minute	min				
second	s				
Physics and chemistry					
all atomic symbols					
alternating current	AC				
ampere	A				
calorie	cal				
direct current	DC				
hertz	Hz				
horsepower	hp				
hydrogen ion activity	pH				
(negative log of)					
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

FISHERY DATA REPORT NO. 05-74

**SOUTHEAST ALASKA STEELHEAD SNORKEL SURVEYS OF
REGIONAL INDEX STREAMS, 2002 AND 2003**

by
Roger D. Harding,
Division of Sport Fish, Douglas

Alaska Department of Fish and Game
Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, Alaska, 99518-1599

December 2005

Development and publication of this manuscript were partially financed by the Federal Aid in Sport fish Restoration Act (16 U.S.C.777-777K) under Project F-10-17 and F-10-18, Job No. R-1-4.

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Roger D. Harding
Alaska Department of Fish and Game, Division of Sport Fish, Region I
802 3rd Street, Douglas, AK 99824-0020, USA

This document should be cited as:

Harding, R. D. 2005. Southeast Alaska steelhead snorkel surveys of regional index streams, 2002 and 2003. Alaska Department of Fish and Game, Fishery Data Series No. 05-74, Anchorage.

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ABSTRACT

Surveys to investigate the spawning abundance of steelhead *Oncorhynchus mykiss* in 10 index streams in Southeast Alaska have been conducted annually since 1997 and were conducted again during 2002 and 2003. Ten index streams in Southeast Alaska Surveys were surveyed by a two- or three-person team using snorkel gear during April and May 2002 and 2003. During the 2002 snorkel surveys, observers obtained a peak count bracketed by lower counts for only four of the 10 index streams; during the 2003 snorkel surveys peak counts were obtained during seven of the index surveys. The peak survey counts in index streams in 2002 were similar to the low counts during 2000 and 2001 but steelhead counts during 2003 were higher and comparable to the highest counts since the project's inception year of 1997.

Key words: steelhead, *Oncorhynchus mykiss*, emigration, abundance, Eagle Creek, Harris River, Humpback Creek, Ketchikan Creek, McDonald Lake Creek, White River, Slippery Creek, Petersburg Creek, Sitkoh Creek, Ford Arm Creek, Peterson Creek, Pleasant Bay Creek, weir, sex, length, abundance indices, snorkel survey, index stream

INTRODUCTION

Southeast Alaska has 271 uniquely identified steelhead *Oncorhynchus mykiss* systems, and an additional 60 tributaries flow into these systems for a total of 331 known water bodies containing steelhead. Most populations are believed to contain 200 or fewer spawning adults. Major sport fisheries occur on larger systems such as the Naha, Karta, and Thorne rivers near Ketchikan, which support up to 1,000 spawning steelhead, and on the Situk River, which has had annual returns of 5,000 to 9,000 or more steelhead. Steelhead harvests in Southeast Alaska generally increased from the late 1970s through 1989, but then began to decline (Mills 1993). As fishery managers and participants reported lower escapements, an Emergency Order (EO) prohibiting steelhead harvests in the Situk River was enacted in 1991. In 1992, harvests were prohibited by EO in 24 popular systems, and in 1993, the Situk and 47 other systems were closed to steelhead harvest. In 1994, the Alaska Board of Fisheries enacted conservative regulations for steelhead in Southeast Alaska, and since 1994, anglers have been limited regionwide to a harvest of 2 steelhead per year with a minimum size limit of 36 inches (914 mm).

Intensive research on steelhead stocks in Southeast Alaska has largely been limited to Petersburg Creek (Jones 1972, 1973, 1974, 1975, 1976, 1983) and the Situk River (Johnson 1990, 1991, 1996; Didier and Marshall 1991; Johnson and Marshall 1991; Glynn 1992; Glynn and Elliott 1993; Bain et

al. 2003; Johnson and Jones 2003). Estimates of migratory timing, abundance, and age composition have also been made for a few other systems (Harding and Jones 1990, 1991, 1992; Jones et al. 1991; Yanusz 1997). Creel surveys of steelhead fisheries have also been conducted (Freeman and Hoffman 1989, 1990, 1991; Hubartt 1989, 1990; Hoffman et al. 1990; Harding and Jones 1991, 1993, 1994; Schmidt 1992), and enhancement has been studied in one system (Freeman 1992, 1995).

Although counts of adult steelhead have been conducted in a few select systems for many years, consistent foot surveys to monitor peak abundance were not initiated until 1994. Since then, survey methodology has evolved, and the streams and reaches selected to survey have changed as observers gained experience with each system (Johnson and Jones 1998, 1999, 2000, 2001, 2003).

Substantial changes in survey methods were also instituted in 1997 to increase the proportion of steelhead observed in index streams and to better identify dates of peak instream abundance (Johnson and Jones 1998). All surveys were converted to snorkel surveys because Shardlow et al. (1987) found that among the most common survey methods, snorkel surveys by experienced observers yield the highest proportion counted (i.e. the number of fish observed/number of known fish in stream). During late April through the end of May 2002 and 2003, the primary objective of the steelhead survey project was to conduct weekly counts of steelhead, for a minimum of three weeks, in standardized sections

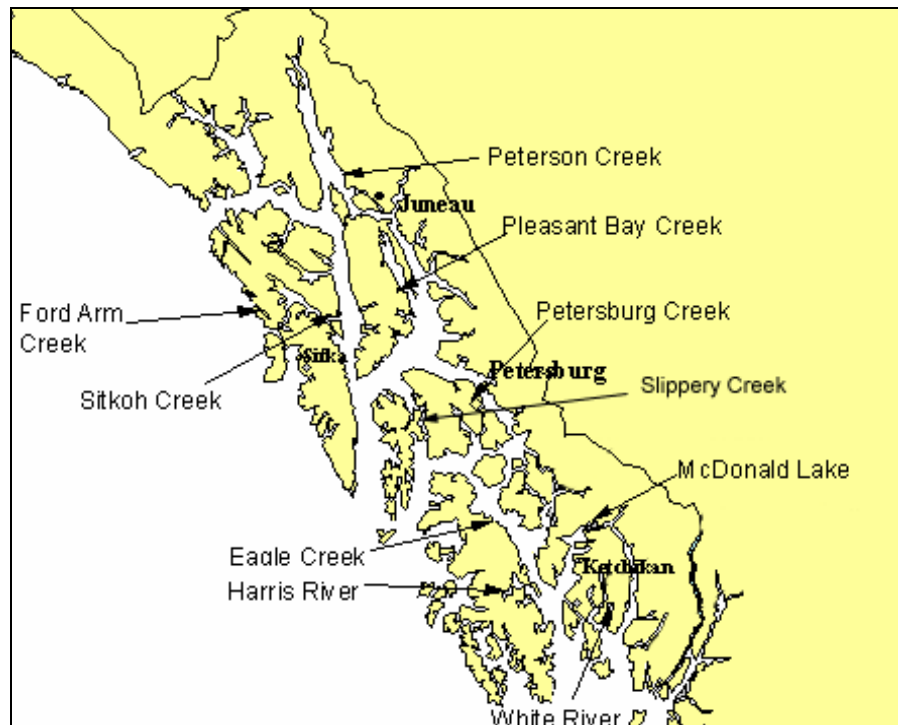


Figure 1.—Locations of the steelhead index systems in Southeast Alaska surveyed in 2002 and 2003.

of 10 index streams. The 10 index streams surveyed for steelhead in 2002 and 2003 were dispersed across Southeast Alaska (Figure 1).

METHODS

SOUTHEAST ALASKA SNORKEL SURVEYS

Snorkel surveys were scheduled to provide indices of peak steelhead abundance for 10 streams in Southeast Alaska in 2002 and 2003 (Figure 1). All streams, with the exception of Slippery Creek, had been surveyed for steelhead since 1997 (Johnson and Jones 1998, 1999, 2000, 2001). The percentage of available stream area surveyed (feet surveyed/feet of anadromous stream) annually averages 54% and ranges from 19% in Ford Arm Creek to 100% in McDonald Lake Creek (Appendix A1).

As in prior years, surveys of index streams were conducted weekly, up to four times (depending on the stream), from late April through the end of May when instream abundance was expected to

peak. A peak count is successfully achieved if it is bracketed by lower counts; if the highest count occurred during the last survey, an additional survey was attempted to obtain a peak count. In many cases a final survey was unable to be completed, thus a final lower count was not obtained and the count is considered a “high” count.

Surveys were conducted by at least two employees wearing dry suits and snorkel gear. One surveyor was always a senior trained observer. Data from each survey in each stream were recorded for discrete sections (reaches) of the river (Appendix A1). If a shore-side (third) party was available, counts were verbally conveyed to them, and they tabulated and then recorded the counts by reach as the survey progressed. When a shore-side party was not available, one or both snorkelers recorded the counts by stream-reach with a waterproof (wax-based) marker on a small plastic diver’s slate until it could be transcribed to conventional data forms.

Observers, as a team, counted all adult steelhead seen during the survey. The surveyors attempted to stay abreast of each other in the stream and coordinated their observations to obtain maximum coverage. When passing through high concentrations of steelhead, both observers counted the number of steelhead in their area of responsibility before consulting with each other on their counts. If either or both surveyors felt that a questionable count was made in a particular pool or stretch of river, the area was recounted. Typically, steelhead were minimally disturbed on the first snorkel pass so second counts of a pool or run were usually possible.

During 2002, the level of surface illumination, subsurface light transmission at a depth of 0.5 m, surface water temperature (°C), and weather conditions (cloud cover, wind, and precipitation) were recorded at the beginning of the survey. Surface illumination and subsurface light transmission were recorded using a Sekonic L-188WH light meter¹ protected by a waterproof underwater housing. The meter was set to an ASA value of 100, and the EV (exposure value) scale at the bottom of the light meter was recorded. On each index system, water levels were recorded at a permanent benchmark established in 1997. This benchmark was either a permanent mark on a bridge abutment, a U.S. Geological Survey (USGS) gauging station, or a mark carved in bedrock. The same habitat variables were recorded during 2003 with the exception that water clarity was measured using a Secchi Disk. The Secchi Disk was held underwater by one observer approximately eight inches below the surface. The second snorkel observer then backed away underwater keeping visual contact with the disk while feeding out the line. The point at which the Secchi Disk disappeared is the distance which was recorded.

STREAM TEMPERATURE MONITORING

Temperature data loggers (HOBO[®] temp logger model H8) were installed in nine of the ten snorkel index streams to provide information on temperature versus peak abundance (no temperature logger was installed in McDonald

Lake Creek). The temperature loggers were scheduled to be installed during the first survey in each of the systems during 2002 and retrieved with replacements during the first survey of 2003. The temperature loggers were programmed to record and store temperatures every 2 hours.

RESULTS

SOUTHEAST ALASKA SNORKEL SURVEYS, 2002

Twenty-four snorkel surveys were conducted on the 10 steelhead index streams during April and May 2002 (Table 1 and Appendix A2). This was an overall reduction in the number of surveys from prior years. As a result, observers obtained a peak count bracketed by lower counts for only four of the index streams. Four streams were only surveyed twice and McDonald Lake Creek was only surveyed once. Peak or high steelhead counts ranged from 13 in Peterson Creek to 200 in Harris River.

SOUTHEAST ALASKA SNORKEL SURVEYS, 2003

Thirty-six snorkel surveys were conducted on the 10 steelhead index streams during April and May 2003 (Table 2 and Appendix A2). This is a relatively higher number of surveys than in previous years. Consequently, observers obtained a peak count bracketed by lower counts for seven of the 10 index streams. Two Prince of Wales Island streams were only surveyed twice (Eagle and Harris); personnel issues prevented a third survey in each system. The peak or high 2003 steelhead counts ranged from 36 in Peterson Creek to 296 in Sitkoh Creek.

In addition, surveys were made on three additional Ketchikan area systems (Appendix A3). Three snorkel surveys of Humpback Creek yielded a high count of 105 steelhead, just slightly above the historic peak of 101 during 2001. Three surveys conducted in Ketchikan Creek yielded an all time high peak count compared to peak counts of 15 and 24 during 2000 and 2001, respectively. Ketchikan Creek is on the Ketchikan road system and has an extensive history of stocking by the Deer Mountain Hatchery, which is located on that

¹ Product names used in this report are included for scientific completeness, but do not constitute a product endorsement.

Table 1.—Steelhead index streams surveyed in 2002 along with dates of peak (P=bracketed) or high (H=unbracketed) counts and numbers of steelhead counted.

Stream name	No. of surveys	Peak/high count date	Peak/high count of steelhead	General location
Eagle Creek	3	14 May	36 (P)	Prince of Wales I.
Harris River	2	7 May	200 (H)	Prince of Wales I.
White River	3	10 May	37 (P)	Revillagigedo I.
McDonald Lake Creek	1	2 May	14 (H)	Southern mainland
Slippery Creek	2	1 May	31 (H)	Kuiu Island
Petersburg Creek	2	20 May	41 (H)	Kupreanof Island
Pleasant Bay Creek	3	17 May	36 (P)	Admiralty Island
Ford Arm Creek	3	22 May	122 (H)	Chichagof Island
Sitkoh Creek	2	20 May	65 (H)	Chichagof Island
Peterson Creek	3	16 May	13 (P)	Northern mainland

Table 2.—Steelhead index streams surveyed in 2003 along with dates of peak (P=bracketed) or high (H=unbracketed) counts and numbers of steelhead counted.

Stream name	No. of surveys	Peak/high count date	Peak/high count of steelhead	General location
Eagle Creek	2	22 May	95 (H)	Prince of Wales I.
Harris River	2	1 May	195 (H)	Prince of Wales I.
White River	3	7 May	77 (P)	Revillagigedo I.
McDonald Lake Creek	3	16 May	79 (P)	Southern mainland
Slippery Creek	3	1 May	76 (H)	Kuiu Island
Petersburg Creek	6	29 April	188 (P)	Kupreanof Island
Pleasant Bay Creek	4	1 May	50 (P)	Admiralty Island
Ford Arm Creek	4	19 May	181 (P)	Chichagof Island
Sitkoh Creek	5	30 April	296 (P)	Chichagof Island
Peterson Creek	4	13 May	36 (P)	Northern mainland

stream. One survey was conducted on Ward Creek and 143 adult steelhead were counted.

STREAM TEMPERATURE MONITORING

Three of the nine temperature loggers set in index streams were lost: Sitkoh, Eagle, and Slippery. The Pleasant Bay Creek temperature logger was recovered but was full of water, apparently bitten by a bear.

Since the temperature loggers were generally set during early surveys in 2002 and retrieved during snorkel surveys in 2003, we do not have a complete temperature profile for either year during steelhead surveys. Temperature data from May 8–June 10, 2002, and from April 1–May 6,

2003 are presented in Figure 2 to correspond with our index surveys. There is temperature data available for the Harris River during 2002 but not for 2003; the temperature logger was not deployed during 2003 until June 7.

Ambient temperatures were colder during the 2002 snorkel surveys than during 2003 and several surveys were delayed as a result of streams remaining frozen until after May 1. The Peterson Creek 2002 temperature graph (Figure 3) illustrates that mean daily temperature did not reach 4° C until May 25. By contrast, in 2003 the Peterson Creek temperature had nearly reached 4° C by May 1.

Table 3.—Peak or high steelhead survey counts for Southeast Alaska index streams, 1997–2003.

Stream Name	1997		1998		1999		2000		2001		2002		2003	
	Peak	High	Peak	High	Peak	High	Peak	High	Peak	High	Peak	High	Peak	High
Peterson Creek	26			29		38		27	41		13		36	
Pleasant Bay Creek		155	81			132	48			48	36		50	
McDonald Lake Creek	145		86			100	47			74 ^b		14 ^b	79	
White River		84	93			60	38		48		37			77
Petersburg Creek		123	152		115			68		64		41	188	
Slippery Creek ^a	NA	NA	NA	NA	NA	NA	NA	42		41		31		76
Eagle/Luck Creek		90	56			118	82		NA	NA	36			95
Harris River		104	156			192	79			53 ^b		200		195
Ford Arm Creek		296		103		89	134			28 ^b		122	181	
Sitkoh Creek		329 ^b		154		120		112		115		65	296	

^a Slippery Creek not sampled in 1997–1999.

^b Based on only one survey count.

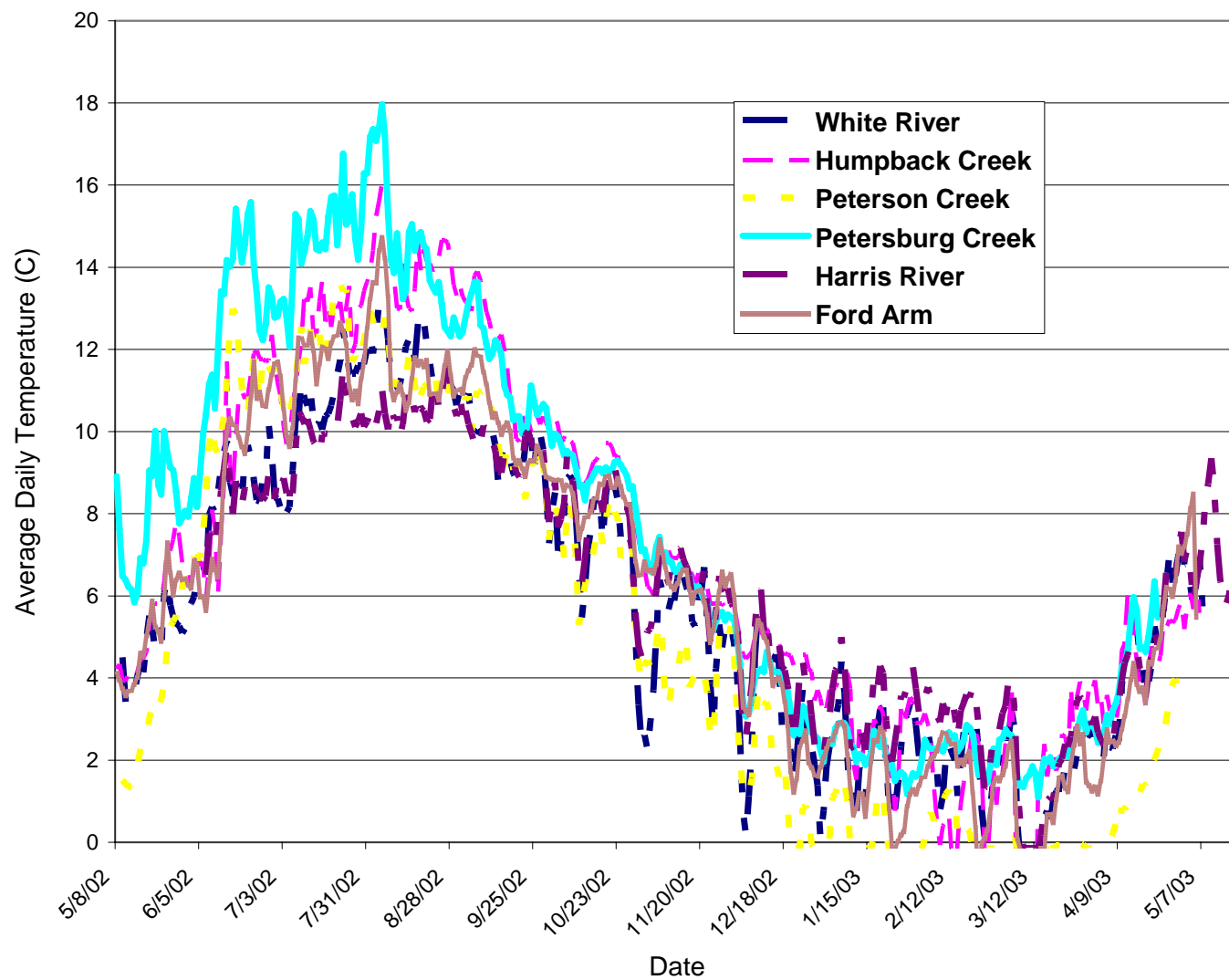


Figure 2.—Stream water temperature for steelhead snorkel streams during 2002 and 2003.

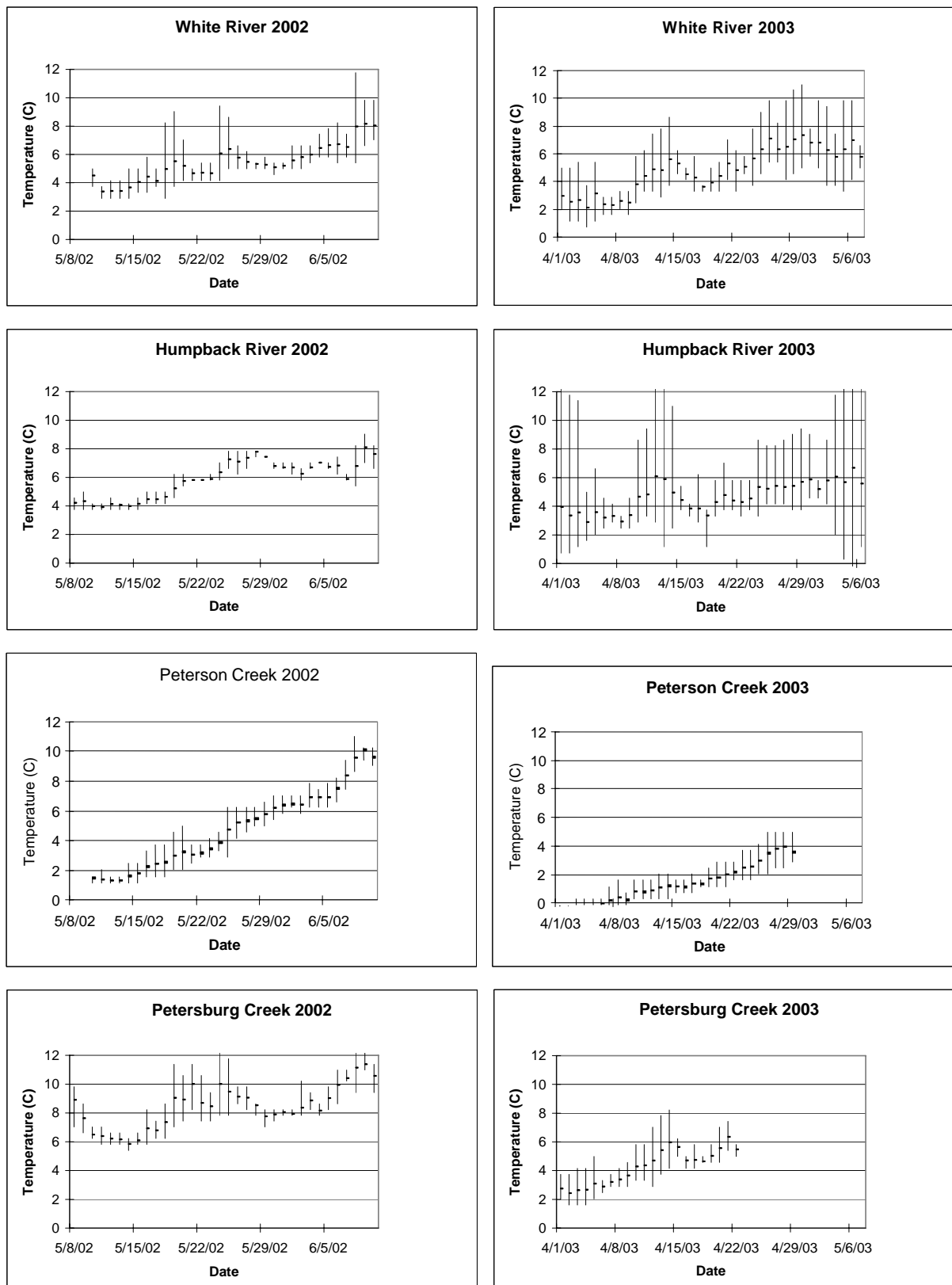


Figure 3.—The daily average and high and low water temperatures recorded at steelhead index streams during our 2002 and 2003 Southeast Alaska steelhead snorkel surveys.

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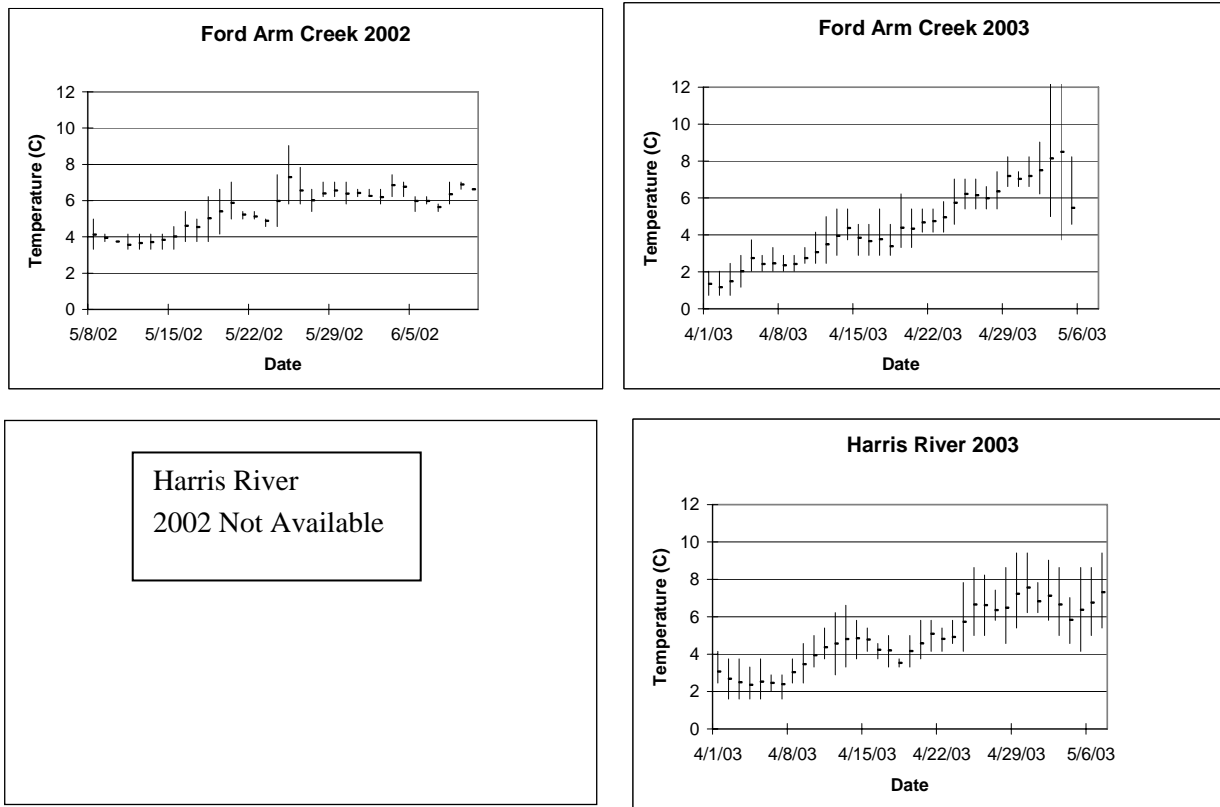


Figure 3.—page 2 of 2.

DISCUSSION

We have consistent snorkel survey data for 8 index streams from 1997 through 2003 (Table 4). Reviewing the peak surveys for index streams in all years reveals that the 2002 counts were similar to the low counts during 2000 and 2001. However, counts were higher during 2003 and were generally comparable to our highest counts seen during the project's inception year of 1997. Snorkel conditions during 2002 were complicated by extremely low water levels and prolonged cold temperatures.

Six of the nine streams surveyed in 2002 had peak or high counts below the 2001 counts while all nine index streams surveyed in 2003 had higher counts than in 2002.

During 2002 concerns about low steelhead abundance were raised and discussed by Sport Fish Area Management Biologists (AMB). The continued trend in 2002 of low snorkel counts was consistent with counts observed over the previous several years. However it was agreed that no

additional conservative management action was deemed necessary.

The increase in steelhead observed during the 2003 snorkel counts was consistent with anecdotal angler reports made to Sport Fish AMBs regarding increased steelhead abundance. There was consensus among AMBs and anglers that steelhead abundance was higher in 2003 throughout most of Southeast Alaska. However, only Slippery Creek posted a new high peak snorkel count in 2003 and this came with only 4 prior years of surveys (2000–2003).

ACKNOWLEDGMENTS

Funding for this project came from the U.S. Fish and Wildlife Service's Federal Aid in Sport Fish Restoration Act, with matching funds coming from the State of Alaska's Fish and Game Fund. We would also like to acknowledge staff who contributed to the 2002 and 2003 snorkel surveys: Brian Glynn, Jason Shull, Rocky Holmes, Tom Brookover, Robert Chadwick, Troy Tydingco, Mark Schwan, Paul Evans, Thomas Miller, Steve

Hoffman, Glenn Freeman, Mike Woods, Amy Holmes, Steve McCurdy, Christine Schmale, David Gregovich, Mark Storm, Nicole Zeiser, Doug Fleming, Vera Goudima, Dale Brandenburger, Larry Edwards, Jon Warrenchuk, Andy Piston, and Kurt Kondzela. Also thanks to Bob Marshall, Randall Mullen, and Mark Schwan who provided planning, analytical and editorial support.

REFERENCES CITED

- Bain, C., S. T. Elliot, R. E. Johnson, and G. Woods. 2003. Situk River steelhead: A review of historical data through 1996. Alaska Department of Fish and Game, Fishery Manuscript No. 03-01, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fm03-01.pdf>
- Didier, A. J., Jr., and R. P. Marshall. 1991. Incidental harvest and voluntary release of steelhead and Chinook salmon in the Situk River commercial set gill net fishery during 1990. Alaska Department of Fish and Game, Fishery Data Series No. 91-19, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fds91-19.pdf>
- Freeman, G. M. 1992. An evaluation of juvenile hatchery steelhead in the Ward Creek system, Ketchikan, Alaska, 1991. Alaska Department of Fish and Game, Fishery Data Series No. 92-55, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fds92-55.pdf>
- Freeman, G. M. 1995. An evaluation of steelhead enhancement in the Ward Creek drainage, Ketchikan, Alaska, 1991-1994. Alaska Department of Fish and Game, Fishery Manuscript No. 95-2, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fm95-02.pdf>
- Freeman, G. M., and S. H. Hoffman. 1989. Steelhead *Oncorhynchus mykiss* creel census on the Klawock River, southeast Alaska, 1987-1988. Alaska Department of Fish and Game, Fishery Data Series No. 118, Juneau. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fds-118.pdf>
- Freeman, G. M., and S. H. Hoffman. 1990. Steelhead *Oncorhynchus mykiss* creel census and recreation survey on the Thorne River, Southeast Alaska, 1988-89. Alaska Department of Fish and Game, Fishery Data Series No. 90-34, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fds90-34.pdf>
- Freeman, G. M., and S. H. Hoffman. 1991. Thorne River steelhead creel and recreation survey, 1989-1990. Alaska Department of Fish and Game, Fishery Data Series No. 91-30, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fds91-30.pdf>
- Glynn, B. 1992. Situk River steelhead trout and Chinook salmon creel surveys and weir, 1991. Alaska Department of Fish and Game, Fishery Data Series No. 92-47, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fds92-47.pdf>
- Glynn, B., and S. Elliott. 1993. Situk River steelhead trout counts, 1992. Alaska Department of Fish and Game, Fishery Data Series No. 93-29, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fds93-29.pdf>
- Harding, R., and J. D. Jones. 1990. Peterson Creek and lake system steelhead evaluation, 1989. Alaska Department of Fish and Game, Fishery Data Series No. 90-37, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fds90-37.pdf>
- Harding, R., and J. D. Jones. 1991. Peterson Creek and Lake system steelhead evaluation, 1990. Alaska Department of Fish and Game, Fishery Data Series No. 91-31, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fds91-31.pdf>
- Harding, R., and J. D. Jones. 1992. Peterson Creek and Lake system steelhead evaluation, 1991. Alaska Department of Fish and Game, Fishery Data Series No. 92-46, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fds92-46.pdf>
- Harding, R., and J. D. Jones. 1993. Karta River steelhead: 1992 escapement and creel survey studies. Alaska Department of Fish and Game, Fishery Data Series No. 93-30, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fds93-30.pdf>
- Harding, R., and J. D. Jones. 1994. Sitkoh creek steelhead: 1993 escapement and harvest. Alaska Department of Fish and Game, Fishery Data Series No. 94-36, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fds94-36.pdf>

REFERENCES CITED (Continued)

- Hoffman, S., H. Koerner, and D. J. Magnus. 1990. Steelhead creel and escapement statistics, in-river distribution, and recreational use survey, Karta River, southeast Alaska, 1989. Alaska Department of Fish and Game, Fishery Data Series No. 90-45, Anchorage.
<http://www.sf.adfg.state.ak.us/FedAidPDFs/fds90-45.pdf>
- Hubartt, D. J. 1989. Ward Creek steelhead creel survey, Ketchikan, Alaska, 1988. Alaska Department of Fish and Game, Fishery Data Series No. 119, Juneau.
<http://www.sf.adfg.state.ak.us/FedAidPDFs/fds-119.pdf>
- Hubartt, D. J. 1990. Ward Creek steelhead creel survey, Ketchikan, Alaska, October 1988 - May 1989. Alaska Department of Fish and Game, Fishery Data Series No. 90-40, Anchorage.
<http://www.sf.adfg.state.ak.us/FedAidPDFs/fds90-40.pdf>
- Johnson, R. E. 1990. Steelhead studies: Situk River, 1989. Alaska Department of Fish and Game, Fishery Data Series No. 90-47, Anchorage.
<http://www.sf.adfg.state.ak.us/FedAidPDFs/fds90-47.pdf>
- Johnson, R. E. 1991. Situk river steelhead studies, 1990. Alaska Department of Fish and Game, Fishery Data Series No. 91-49, Anchorage.
<http://www.sf.adfg.state.ak.us/FedAidPDFs/fds91-49.pdf>
- Johnson, R. E. 1996. Situk River steelhead trout studies, 1994. Alaska Department of Fish and Game, Fishery Data Series No. 96-1, Anchorage.
<http://www.sf.adfg.state.ak.us/FedAidPDFs/fds96-01.pdf>
- Johnson, R. E., and J. D. Jones. 1998. Southeast Alaska steelhead studies, 1997: Situk River weir and surveys of index streams. Alaska Department of Fish and Game, Fishery Data Series No. 98-45, Anchorage.
<http://www.sf.adfg.state.ak.us/FedAidPDFs/fds98-45.pdf>
- Johnson, R. E., and J. D. Jones. 1999. Southeast Alaska steelhead studies, 1998: Situk River weir and surveys of regional index streams. Alaska Department of Fish and Game, Fishery Data Series No. 99-33, Anchorage.
<http://www.sf.adfg.state.ak.us/FedAidPDFs/fds99-33.pdf>
- Johnson, R. E., and J. D. Jones. 2000. Southeast Alaska steelhead studies, 1999: Situk River weir and surveys of regional index streams. Alaska Department of Fish and Game, Fishery Data Series No. 00-16, Anchorage.
<http://www.sf.adfg.state.ak.us/FedAidPDFs/fds00-16.pdf>
- Johnson, R. E., and J. D. Jones. 2001. Southeast Alaska steelhead studies, 2000: Situk River weir and surveys of regional index streams. Alaska Department of Fish and Game, Fishery Data Series No. 01-20, Anchorage.
<http://www.sf.adfg.state.ak.us/FedAidPDFs/fds01-20.pdf>
- Johnson, R. E., and J. D. Jones. 2003. Southeast Alaska steelhead studies, 2001: Situk River weir and surveys of regional index streams. Alaska Department of Fish and Game, Fishery Data Series No. 03-18, Anchorage.
<http://www.sf.adfg.state.ak.us/FedAidPDFs/fds03-18.pdf>
- Johnson, R. E., and R. P. Marshall. 1991. Harvest estimates for selected sport fisheries in Yakutat, Alaska in 1990. Alaska Department of Fish and Game, Fishery Data Series No. 91-42, Anchorage.
<http://www.sf.adfg.state.ak.us/FedAidPDFs/fds91-42.pdf>
- Jones, D. E. 1972. A study of steelhead-cutthroat trout in Alaska. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1971-1972, Project F-9-4, 13 (G-II-I), Juneau.
- Jones, D. E. 1973. Steelhead and sea-run cutthroat trout life history in Southeast Alaska. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1972-1973, Project AFS-42, 14 (AFS-42-1), Juneau.
- Jones, D. E. 1974. Life history of steelhead trout in Southeastern Alaska. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1973-1974, Project AFS-42, 15 (AFS-42-2), Juneau.
- Jones, D. E. 1975. Life history of steelhead trout. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1974-1975, Project AFS 42, 16 (AFS 42-3-A), Juneau.
- Jones, D. E. 1976. Life history of steelhead trout. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1975-1976, Project AFS-42, 17 (AFS-42-4-A), Juneau.

REFERENCES CITED (Continued)

- Jones, D. E. 1983. Steelhead investigations in Southeast Alaska. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1982-1983, Project AFS-42, 24 (AFS-42-10-A), Juneau.
- Jones, J. D., R. Harding, and A. Schmidt. 1991. Sitkoh Creek steelhead study, 1990. Alaska Department of Fish and Game, Fishery Data Series No. 91-32, Anchorage.
<http://www.sf.adfg.state.ak.us/FedAidPDFs/fds91-32.pdf>
- Mills, M. J. 1993. Harvest, catch, and participation in Alaska sport fisheries during 1992. Alaska Department of Fish and Game, Fishery Data Series No. 93-42, Anchorage.
<http://www.sf.adfg.state.ak.us/FedAidPDFs/fds93-42.pdf>
- Schmidt, A. E. 1992. Sitkoh Creek steelhead study, 1991. Alaska Department of Fish and Game, Fishery Data Series No. 92-31, Anchorage.
<http://www.sf.adfg.state.ak.us/FedAidPDFs/fds92-31.pdf>
- Shardlow, T., R. Hilborn, and D. Lightly. 1987. Components analysis of instream escapement methods for Pacific salmon (*Oncorhynchus spp.*). pp 1031-1037 [in] Canadian Journal of Fisheries and Aquatic Sciences, Vol. 44.
- Yanusz, R. J. 1997. Status of sea-run cutthroat trout, sea-run Dolly Varden, and steelhead populations at Sitkoh Creek, Southeast Alaska, during 1996. Alaska Department of Fish and Game, Fishery Data Series No. 97-23, Anchorage.
<http://www.sf.adfg.state.ak.us/FedAidPDFs/fds97-23.pdf>

APPENDIX A

Appendix A1.—Steelhead index stream name, anadromous stream number, management area, length and percent of stream surveyed, number of survey reaches, and approximate dates for start of weekly surveys for steelhead in 2002 and 2003.

Index Streams	Anadromous Stream Number	Area	Dist. to be surveyed in feet^a	Percent of Stream Surveyed	Number of Reaches	Target Survey Start^b
Ford Arm Creek	113-73-10030	Sitka	4,582/24,002	19%	2	30-Apr
Sitkoh Creek	113-59-10004	Sitka	16,192/20,136	80%	3	30-Apr
Peterson Creek	111-50-10010	Juneau	3,663/7,553	48%	1	30-Apr
Pleasant Bay Creek	111-12-10005	Juneau	6,630/12,405	54%	2 ^c	30-Apr
Petersburg Creek	106-44-10600	Petersburg	22,401/72,983	31%	2	30-Apr
Slippery Creek	109-43-10030	Petersburg	9,618/11,491	84%	3	30-Apr
Eagle Creek	107-40-10055	POW	28,716/49,136	58%	4	23-Apr
Harris River	102-60-10820	POW	38,758/96,466	40%	5	23-Apr
McDonald Lake Creek	101-80-10068	Ketchikan	11,259/11,259	100%	4	23-Apr
White River	101-44-10024	Ketchikan	19,719/35,750	55%	3	23-Apr

^a Feet to be surveyed/feet of anadromous stream.

^b Additional surveys are required if highest counts occur during last of three surveys.

^c Stream reach 3 dropped in 2000 due to safety concerns and because <10% of steelhead were ever observed in this section of river.

Appendix A2.—Counts of steelhead from 2002 surveys by stream, date, and reach of stream along with measured habitat variables.

Stream name	Date	Reach	Distance surveyed	Survey type ^a	Live	Redds	Weather codes ^b	Observers ^c	Codes ^d	Light Level ^e	Light Trans	Temp (C)	Comments
Eagle Creek	05/08/02	1	13712	S	0	1	O	SM, JN	21, 33				
	05/08/02	2	6253	S	2	4	O	SM, JN	21, 33				
	05/08/02	3	5044	S	8	0	O	SM, JN	21, 33				
	05/08/02	4	3707	S	5	0	O	SM, JN	21, 33				
	05/14/02	1		S	5		C	SM, MS	22, 31				
	05/14/02	2		S	20		C	SM, MS	22, 31				
	05/14/02	3		S	11		C	SM, MS	22, 31				
	05/14/02	4		S	0		C	SM, MS	22, 31				No count, high water
	05/23/02	1		S	0		O	MS, DB	22, 31				
	05/23/02	2		S	20		O	MS, DB	22, 31				
	05/23/02	3		S	14		O	MS, DB	22, 31				
	05/23/02	4		S			O	MS, DB	22, 31				No count, high water
Ford Arm	05/07/02	1	Length	S	4	0	O	REC, TT	43, 33			3.0	
	05/07/02	2	Length	S	11	0	O	REC, TT	43, 33			3.0	
	05/13/02	1	Length	S	58	6	R	REC, TT, RH	23, 32			3.5	
	05/13/02	2	Length	S	37	0	R	REC, TT, RH	23, 32			3.5	
	05/22/02	1	Length	S	74		R	TT, LE, PE	22, 32			5.5	
	05/22/02	2	Length	S	48		R	TT, LE, PE	22, 32			5.5	
Harris River	05/07/02	1		S	3	0	C	SM	21, 33				
	05/07/02	2		S	101	10	C	SM	21, 33				
	05/07/02	3		S	84		C	USFS	21, 33				
	05/07/02	4		S	12		C	USFS	21, 33				
	05/07/02	5		S	0		C	USFS	21, 33				
	05/15/02	1		S	3		O	MS, DB	22, 32				Total=154
	05/15/02	2		S	89		O	MS, DB	22, 32				
	05/15/02	3		S	60		O	USFS	22, 32				Count reaches 3 and 4 combined
	05/15/02	4		S			O	USFS	22, 32				
	05/15/02	5		S	2		O	USFS	22, 32				

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Stream name	Date	Reach	Distance surveyed	Survey type ^a	Live	Redds	Weather codes ^b	Observers ^c	Codes ^d	Light Level ^e	Light Trans	Temp (C)	Comments
Humpback Creek	04/25/02	1		S	22	0	C	GF,AP	21		10.0	3.5	Water level=33; very low/clear
	04/25/02	2		S	23	0	C	GF,AP	21		10.0	3.5	Water level=33; very low/clear
	04/25/02	3		S	30	2	C	GF,AP	21		10.0	3.5	Water level=33; very low/clear
	04/25/02	4		S	0	0	C	GF,AP	21		10.0	3.5	Water level=33; very low/clear
	05/08/02	1		F	3	0	O	SNH	22, 32			5.0	
	05/08/02	2		F	91	0	O	SNH	22, 32			5.0	
	05/08/02	3		F	0	0	O	SNH	22, 32			5.0	
	05/08/02	4		F	0	0	O	SNH	22, 32			5.0	
Ketchikan Creek	04/29/02	1		S	0	0	C	ABH, AP	21		10.0	3.5	Level 33; water level 3" below marker extremely low water
	04/29/02	2		S	0	0	C	ABH, AP	21		10.0	3.5	Level 33; water level 3" below marker extremely low water
	04/29/02	3		S	5	0	C	ABH, AP	21		10.0	3.5	2 RB
	05/09/02	1		S	1	0	C	SNH	22, 33			7.0	8 RB, 6-8"
	05/09/02	2		S	2	0	C	SNH	22, 33			7.0	3 RB, 6-8"
	05/09/02	3		S	2	0	C	SNH	22, 33			7.0	1 RB, 6-8"
McDonald Lake Creek	05/02/02	1	0.5	S	6	0	C	GF,AP	23, 31			3.5	Water dark
	05/02/02	2	0.5	S	0	0	C	GF,AP	23, 31			3.5	Poor visibility
	05/02/02	3	0.3	S/F	6	0	C	GF,AP	23, 31			3.5	1 @ Lake Outlet
	05/02/02	4	0.8	S	2	0	C	GF,AP	23, 31			3.5	
Petersburg Creek	05/07/02	1		S	13	0	O	DB, VG	21, 33			4.5	Water level = 20"
	05/07/02	2		S	27	1	O	DB, VG	21, 33			4.5	Water level = 20"
	05/20/02	1		S	14	1	C	DB, VG	22, 32			8.5	Water level = 14"
	05/20/02	2		S	27	0	O	DB, VG	22, 32			8.5	
Peterson Creek	05/10/02	1	Length	S	0			MS, BG	22			2.0	Cold, water a little high; Depth 23.0 cm
	05/16/02	1	Length	S	13		O	BG, NZ	22			3.5	Water level 31 (9 3/8");2 small SH included in total
	05/31/02	1	Length	S	5	0	O	MS, BG	22			6.5	Water level 35.5 cm

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Stream name	Date	Reach	Distance surveyed	Survey type ^a	Live	Redds	Weather codes ^b	Observers ^c	Codes ^d	Light Level ^e	Light Trans	Temp (C)	Comments
Pleasant Bay	05/08/02	1	Length	S	6			BG, MS, RH	21, 33			4.0	Water level=19 inches; lowest water ever seen
	05/08/02	2	Length	S	22			BG, MS, RH	21, 33			4.0	21 SH gage pool, 1 SH bedrock pool
	05/17/02	1	Length	S	15	0	C, O	MS, R Holmes	22			3.5	Water level=21.5 inches
	05/17/02	2	Length	S	21	0	C, O	MS, R Holmes	22			3.5	Water level=21.5 inches
	05/24/02	1	Length	S	10		C	MS, RH, JD	32			6.0	
	05/24/02	2	Length	S	11		C	MS, RH, JD	32			6.0	Water level=8.5 inches
Sitkoh Creek	05/14/02	1	Length	S	8		O/R	BC, TT, RH	21, 31			4.0	74 RBT, 4 CT, 1 DV
	05/14/02	2	Length	S	10		O/R	BC, TT, RH	21, 31			4.0	Ran into Italian film crew
	05/14/02	3	Length	S	29		O/R	BC, TT, RH	21, 31			4.0	
	05/20/02	1	Length	S	23		C	BC, TT, SC	32			5.5	
	05/20/02	2	Length	S	17		C	BC, TT, SC	32			5.5	
	05/20/02	3	Length	S	25		C	BC, TT, SC	32			5.5	
Slippery Creek	05/01/02	1	0.5 mi	S	1	0	O	DB, UG, EJ	21,33	9.5	8.5	6.0	Water level 8"
	05/01/02	2	1 mi	S	30	1	O	DB, UG, EJ	21,33	9.5	8.5	6.0	Water level 8"
	05/01/02	3	0.5 mi	S	0	0	O	DB, UG, EJ	21,33	9.5	8.5	6.0	Water level 8"
	05/15/02	1	0.5 mi	S	9	0	R	ST, VG	22, 32	10.0	9.5	6.0	Water level 1.3ft
	05/15/02	2	1 mi	S	19	0	R	ST, VG	22, 32	10.0	9.5	6.0	Water level 1.3ft
	05/15/02	3	0.5 mi	S	1	0	R, W	ST, VG	22, 32	10.0	9.5	6.0	Water level 1.3ft
White River	05/01/02	1		S	8	0	C	ABH, AP	22, 23, 31			5.0	Water rising due to snowmelt
	05/01/02	2		S	2	0	C	ABH, AP	22, 23, 31			5.0	Water rising due to snowmelt
	05/01/02	3		S	3	0	C	ABH, AP	22, 23, 31			5.0	Water rising due to snowmelt
	05/10/02	1		S	7	0	O	SNH	22, 32			8.0	
	05/10/02	2		S	14	0	O	SNH	22, 32			8.0	
	05/10/02	3		S	16	0	O	SNH	22, 32			8.0	
	05/22/02	1		S	7	0	O	ABH, MAW	22, 31			8.0	1 RB

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^a S = snorkel, F = foot, R&R = rod and reel.

^b C = clear, O = overcast, R = rain, O/C = Overcast with breaks.

^c Primary observer(s): MS (Mark Schwan), BG (Brian Glynn), KK (Kurt Kondzela), DJ (Doug Jones), MW (Mike Wood), BC (Bob Chadwick), GF (Glenn Freeman), TB (Tom Brookover), TT (Troy Tydingco), AP (Andy Piston), VG (Vera Goudima), DB (Dean Beers), TQ (Todd Qualls), DM (Dave Magnus).

^d 12 = fish present in the intertidal but not counted, 21 = excellent visibility, 22 = normal visibility, 23 = poor visibility, 31 = high water, 32 = normal water, 33 = low water.

^e Light levels are EV values from a light meter calibrated to ASA 100.

Appendix A3.—Counts of steelhead from 2003 surveys by stream, date, and reach of stream along with measured habitat variables.

Stream name	Date	Reach	Distance surveyed	Survey type ^a	Live	Redds	Weather codes ^b	Observers ^c	Codes ^d	Light Level ^e	Light Trans	Temp.	Comments
Eagle Creek	05/16/03	1		S	2		C	SM, MS	21, 33				Secchi disk 11'
	05/16/03	2		S	9		C	SM, MS	21, 33				Secchi disk 11'
	05/16/03	3		S	59		C	SM, MS	21, 33				Secchi disk 11'
	05/16/03	4		S	3		C	SM, MS	21, 33				Secchi disk 11'
	05/22/03	1		S	4	1	C	SHN, MS	22, 33				Secchi disk 12'
	05/22/03	2		S	15	12	C	SHN, MS	22, 33				Secchi disk 12'
	05/22/03	3		S	56	40	C	SHN, MS	22, 33				Secchi disk 12'
	05/22/03	4		S	20	2	C	SHN, MS	22, 33				Secchi disk 12'
Ford Arm	04/28/03	1	Length	S	28	0	C	REC, TT, RH	22, 32, 42			4.5	Secchi disk 13'
	04/28/03	2	Length	S	106	0	C	REC, TT, RH	22, 32, 42			4.5	Secchi disk 13'
	05/05/03	1	1723.0	S	48	0	C/W	REC, TT, TB	21, 33			4.5	Secchi disk 13-14'
	05/05/03	2	2859.0	S	79	0	C/W	REC, TT, TB	21, 33, 42			4.5	Secchi disk 13-14'
	05/19/03	1	1723.0	S	107	12 +	C/W	REC, TT, PE	22, 33			6.0	Secchi disk 9-18'
	05/19/03	2	2859.0	S	74	12 +	C/W	REC, TT, PE	22, 33			6.0	Secchi disk 9-18'
	05/29/03	1	1723.0	S	63	27	O/R	REC, TT, TM	22, 32			6.0	Secchi disk 13-15'
	05/29/03	2	2859.0	S	24	177	O/R	REC, TT, TM	22, 32			6.0	Secchi disk 13-15'
Harris River	05/01/03	5		S	0		C	SHN, MS	21, 33			5.0	Secchi disk 25'
	05/01/03	4		S	13	4	C	SHN, MS	21, 33			5.0	
	05/01/03	3		S	62		C	SHN, MS	21, 33			5.0	
	05/01/03	2		S	109		C	SHN, MS	21, 33			5.0	Secchi disk 25'
	05/01/03	1		S	11		C	SHN, MS	21, 33			5.0	Secchi disk 25'
	05/19/03	1		S	2	3	C	SM, SHN	21			8.0	Secchi disk 23'
	05/19/03	2		S	3	14	C	SM, SHN	21			8.0	Secchi disk 23'
	05/19/03	3		S	22	12	C	SM, SHN	21			8.0	Secchi disk 23'
	05/19/03	4		S	60	8	C	SM, SHN	21			8.0	Secchi disk 23'
	05/19/03	5		S	7	0	C	SM, SHN	21			8.0	Secchi disk 23'

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Stream name	Date	Reach	Distance surveyed	Survey type ^a	Live	Redds	Weather codes ^b	Observers ^c	Codes ^d	Light Level ^e	Light Trans	Temp	Comments
Humpback Creek	04/23/03	1		S	10			O/R	GF,ABH	22.0			NA
	04/23/03	2		S	49		O/R	GF, ABH	22			NA	Secchi disk 33'
	04/23/03	3		S	11		O	GF, ABH	22			NA	Secchi disk 33'
	04/23/03	4		S	0		O	GF, ABH	22			NA	Secchi disk 33'
	05/28/03	1		S	2	6	R	SNH, NZ	23			11	Secchi disk 32'
	05/28/03	2		S	11	18	R	SNH, NZ	23			11	Secchi disk 32'
	05/28/03	3		S	2	4	R	SNH, NZ	23			11	Secchi disk 32'
	05/06/03	1		S	6	2	C	SHN, AH	21			NA	Secchi disk 33'
	05/06/03	2		S	99	23	C	SHN, AH	21			NA	Secchi disk 33'
	05/06/03	3		S	0	12	C	SHN, AH	21			NA	Secchi disk 33'
Ketchikan Creek	05/14/03	1		S	28	0	C	SH, NZ	22			9.0	Secchi disk 35'
	05/14/03	2		S	20	0	C	SH, NZ	22			9.0	Secchi disk 35'
	05/14/03	3		S	5	0	C	SH, NZ	22			9.0	Secchi disk 35'
	05/20/03	1		S	34	0	C	SH, NZ	22			10.5	Secchi disk 35'
	05/20/03	2		S	17	6	C	SH, NZ	22			10.5	Secchi disk 35'
	05/20/03	3		S	9	0	C	SH, NZ	22			10.5	Secchi disk 35'
	05/27/03	1		S	19	2	O	SH, TB	22			9.0	Secchi disk 32'
	05/27/03	2		S	15	15	O	SH, TB	22			9.0	
	05/27/03	3		S	7	0	O	SH, TB	22			9.0	
McDonald Lake Creek	04/29/03	1		S	10		C	SH, GF	22	10.0	9.0	4.0	Secchi disk 23'
	04/29/03	2		S	10		C	SH, GF	22	10.0	9.0	4.0	Secchi disk 23'
	04/29/03	3		S	13		C	SH, GF	22	10.0	9.0	4.0	Secchi disk 23'
	04/29/03	4		S	6		C	SH, GF	22	10.0	9.0	4.0	Secchi disk 23'
	05/16/03	1		S	28	2	C	SH, GF	22			8.0	Secchi disk 23'
	05/16/03	2		S	25	6	C	SH, GF	22			8.0	Secchi disk 23'
	05/16/03	3		S	20	3	C	SH, GF	22			8.0	Secchi disk 23'
	05/16/03	4		S	6	1	C	SH, GF	22			8.0	Secchi disk 23'
	06/04/03	1		S	18	6	O	SHN, NZ	22			10.0	Secchi disk 22'

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Appendix A3.—Page 3 of 5.

Stream name	Date	Reach	Distance surveyed	Survey type ^a	Live	Redds	Weather codes ^b	Observers ^c	Codes ^d	Light Level ^e	Light Trans	Temp (C)	Comments
McDonald Lake Creek	06/04/03	2		S	20	4	O	SHN, NZ	22			10.0	Secchi disk 22'
	06/04/03	3		S	11	2	O	SHN, NZ	22			10.0	Secchi disk 22'
	06/04/03	4		S	12	4	O	SHN, NZ	22			10.0	Secchi disk 22'
Petersburg Creek	04/22/03	1		S	40	15 ?	O	DF, KK, VG	22, 13			6.0	Secchi disk 14'
	04/22/03	1 ^{a f}	1500.0		8								
	04/22/03	2		S	70	5 ?	O	DF, KK, VG	22, 12			6.0	Secchi disk 14'
	04/29/03	1		S	38	0	C	DF, VG, DG	21, 33			7.0	Secchi disk 21'
	04/29/03	2		S	78	0	C	DF, VG, DG	21, 33	10.0		7.0	Secchi disk 21'
	04/29/03	Pool cabins		S	30	0	C	DF, VG, DG	21, 33	10.0		7.0	
	05/06/03	1		S	48	51	C	DF, VG, MS	21, 33	8.5		8.5	Secchi disk 17.5'
	05/06/03	2		S	75	60	C	DF, VG, MS	21, 33	8.5		8.5	Secchi disk 17.5'
	05/06/03	Pool cabins		S	65	nd	C	DF, VG, DG	21, 33	10		7.0	
	05/06/03	Hoagies Hole		S	0	nd	C	DF, VG, MS	21, 33	8.5		8.5	
	05/19/03	1		S	17	25	C	DF, VG, MS	21, 32	nd		9.0	Secchi disk 20'
	05/19/03	2		S	66	34	C	DF, VG, MS	21, 32	nd		9.0	Secchi disk 20'
	05/19/03	Pool cabins		S	8	nd	C	DF, VG, MS	21, 33	8.5		8.5	
Peterson Creek	04/29/03	1	Length	S	17	NA	C	BG, JS	22			6.5	
	05/06/03	1	Length	S	13	NA	C	BG, JS	22			6.5	
	05/13/03	1	Length	S	36		O, R	BG, KK	22,23			6.5	
	05/21/03	1	Length	S	5		C	BG, KK, CS, RH	21			9.0	
Pleasant Bay	04/25/03	1	Length	S	11		C	BG, JS	21			4.0	Secchi disk 8.5'
	04/25/03	2	Length	S	8		C	BG, JS	21			4.0	Secchi disk 8.5'
	05/01/03	1	Upper	S	27		C	BG, JS	21			5.0	
	05/01/03	2	Lower	S	23		C	BG, JS	21			5.0	
	05/08/03	1	Upper	S	22		C	BG, JS	21			6.5	
	05/08/03	2	Lower	S	23		C	BG, JS	21			6.5	
	05/19/03	1	Upper	S	11		C	BG, RH, CS	21				
	05/19/03	2	Lower	S	13		C	BG, RH, CS	21				

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Stream name	Date	Reach	Distance surveyed	Survey type ^a	Live	Redds	Weather codes ^b	Observers ^c	Codes ^d	Light ^e	Trans	Temp.	Comments
Sitkoh Creek	04/15/03	1	3264'	S	0		R/O	BC, TT, DB	21, 12			1.0	
	04/15/03	2	6128'	S	1		R/O	BC, TT, DB	21, 12			1.0	
	04/15/03	3	6800'	S	9		R/O	BC, TT, DB	21, 12			1.0	
	04/15/03	Below weir	Length	S	7		R/O	BC, TT, DB	21, 12			1.0	
	04/22/03	1	3264'	S	2		O/W	BC, TT, LE	22/21, 32			2.5	
	04/22/03	2	6128'	S	22		O/W	BC, TT, LE	22/21, 32			2.5	
	04/22/03	3	6800'	S	48	0	O/W	BC, TT, LE	22/21, 32			2.5	
	04/22/03	Below weir	Length	S	33	0	O/W	BC, TT, LE	22/21, 32			2.5	
	04/29/03	1	3264'	S	18	0	C	BC, TT, JW	22, 32/31			4.0	Secchi disk 12'
	04/29/03	2	6128'	S	41	0	C	BC, TT, JW	22, 32/31			4.0	Secchi disk 12'
	04/29/03	3	6800'	S	101	0	C	BC, TT, JW	22, 32/31			4.0	Secchi disk 12'
	04/29/03	Below weir	Length	S	22	0	C	BC, TT, JW	22, 32/31			4.0	Secchi disk 12'
	04/30/03	1	3264'	S	28	0	C	BG, JS, LE	21			4.5	
	04/30/03	2	6128'	S	58	0	C	BG, JS, LE	21			4.5	
	04/30/03	3	6800'	S	160	0	C	BG, JS, LE	21			4.5	
	04/30/03	Below weir	Length	S	50	0	C	BG, JS, LE	21			4.5	
	05/20/03	1	3264'	S	5	15+	C	BC, TT, LE	22/21, 33			7.0	Secchi disk 14'
	05/20/03	2	6128'	S	45	20+	C	BC, TT, LE	22/21, 33			7.0	Secchi disk 14'
	05/20/03	3	6800'	S	55	11	C	BC, TT, LE	22/21, 33			7.0	Secchi disk 14'
	05/20/03	Second hole above weir		S	93	0	C	BC, TT, LE	22/21, 33			7.0	Secchi disk 14'
	05/20/03	Run above weir		S	47	0	C	BC, TT, LE	22/21, 33			7.0	Secchi disk 14'
	05/20/03	Below weir	Length	S	8	0	C	BC, TT, LE	22/21, 33				
	05/20/03	1	3264'	S	2	0	C	AH, GF					
	05/20/03	2	6128'	S	48	0	C	AH, GF					
	05/20/03	3	6800'	S	71	0	C	AH, GF					
	05/20/03	Second hole above weir		S	68	0	C	AH, GF					
	05/20/03	Run above weir		S	52	0	C	AH, GF					
	05/20/03	Below weir	Length	S	4	0	C	AH, GF					

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Stream name	Date	Reach	Distance surveyed	Survey type ^a	Live	Redds	Weather codes ^b	Observers ^c	Codes ^d	Light Level ^e	Light Trans	Temp	Comments
Slippery Creek	05/01/03	1	Length	S	3	0	C	DF, VG	22	nd		11.0	Secchi disk 20'
	05/01/03	2	Length	S	69	0	C	DF, VG	21	nd		11.0	Secchi disk 20'
	05/01/03	3	Length	S	4	0	C	DF, VG	22	nd		11.0	
	05/08/03	1	Length	S	4	0	C	DF, VG	22	nd		11.0	Secchi disk 24'
	05/08/03	2	Length	S	61	18 +	C	DF, VG	21	10.0		8.5	Secchi disk 20'
	05/08/03	3	Length	S	5	nd	C	DF, VG	21	nd		11.0	
	05/16/03	1	Length	S, F	2	0	C	DF, VG	22	nd		11.0	Secchi disk 24'
	05/16/03	2	Length	S, F	25	many	C	DF, VG	21	10.0		8.5	Secchi disk 20'
	05/16/03	3	Length	S, F	0	nd	C	DF, VG	21	nd		11.0	
Ward Creek	05/21/03	1	Length	S	28	6	R	SHN,MW,NZ	23			10.0	Secchi disk 13'
	05/21/03	2	Length	S	40	10	R	SHN,MW,NZ	23			10.0	Secchi disk 13'
	05/21/03	3	Length	S	75	4	R	SHN,MW,NZ	23			10.0	Secchi disk 13'
White River	04/24/03	1		S	27	2	C	GF/MW	21, 32				
	04/24/03	1		S	20	4	C/O	GF/MW	22, 32				
	04/24/03	1		S	28	0	C	GF/MW	21, 32				
	05/07/03	1		S	13	22	C	SHN, AH	21				Secchi disk 25'
	05/07/03	2		S	12	8	C	SHN, AH	21				Secchi disk 25'
	05/07/03	3		S	49	4	C	SHN, AH	21				Secchi disk 25'
	05/07/03	4		S	3	0	C	SHN, AH	21				Secchi disk 25'
	05/15/03	1		S	8	6	O	SHN,MW	22			8.0	Secchi disk 20'
	05/15/03	2		S	8	4	O	SHN,MW	22			8.0	Secchi disk 20'
	05/15/03	3		S	29	0	O	SHN,MW	22			8.0	Secchi disk 20'
	05/15/03	4		S	2	0	O	SHN,MW	22			8.0	Secchi disk 20'

^a S = snorkel, F = foot, R&R = rod and reel.

^b C = clear, O = overcast, R = rain, O/C = overcast with breaks.

^c Primary observer(s): MS (Mark Schwan), BG (Brian Glynn), KK (Kurt Kondzela), DJ (Doug Jones), MW (Mike Wood), BC (Bob Chadwick), GF (Glenn Freeman), TB (Tom Brookover), TT (Troy Tydingco), AP (Andy Piston), VG (Vera Goudima), DB (Dean Beers), TQ (Todd Qualls), DM (Dave Magnus).

^d 12 = fish present in the intertidal but not counted, 21 = excellent visibility, 22 = normal visibility, 23 = poor visibility, 31 = high water, 32 = normal water, 33 = low water.

^e Light levels are EV values from a light meter calibrated to ASA 100.

^f Surveyed upper part of fast section not normally surveyed and observed 8 steelhead in 1,500 feet.